



POTTER

PRODUCT  
DATA  
3-102



## HSP-3502 CHAIN PRINTER





# NEW FROM





# POTTER®

## THE WORLD'S MOST ADVANCED HIGH-SPEED CHAIN PRINTER

The HSP-3502 Chain Printer is the latest development from Potter's engineering laboratories. Chain Printers provide the ultimate in user satisfaction due to the precise control of vertical registration. The chain-design concept, formerly available from only one computer manufacturer, is now provided to the industry in a revolutionary, value-engineered design.

The order-of-magnitude reduction made in the total number of parts enormously enhances reliability. **There are fewer than 90 different mechanical parts, and fewer than 115 different electrical components in the basic printer.** Wiring simplification, the use of integrated circuits, and reduction in number of hammers and driver circuits to one half, have eliminated thousands of parts.

The chain system makes the 3502 Chain Printer substantially lower in cost than comparative systems and extraordinarily simple to maintain and operate.

Value engineered from the major functional components such as the unique, radically new, 192 character horizontal type font to the mounting hardware, the Potter 3502 Printer represents a new concept in reliability and maintainability.



## REVOLUTIONARY NEW CONCEPT



### FEATURES

- High Speed — up to 600 lines per minute
- High Capacity — up to 192 characters in 128 columns
- Precise Vertical Registration
- Sharp Character Definition
- Alphanumeric, Numeric & Symbolic Printing Capability
- Integrated Circuit Electronics
- Electronically Adjustable Double Width Hammers
- Immediate Visibility of Last Line Printed
- Minimum Number of Parts — less than 90 mechanical parts . . . less than 115 electrical components
- Price Breakthrough — LOW COST

### APPLICATION

The HSP-3502 is designed for use with all computers and data processing systems. This versatile printing system can also be interfaced off-line with a tape transport for use as an off-line print station, or interfaced with a DATA-PHONE® for remote terminal system applications.

### DESCRIPTION

**PRINT MECHANISM** The heart of the new Potter Printer is a uniquely designed, continuous rotating chain. The chain contains individually attached, dual redundant characters along its periphery on 0.2 inch centers. The print hammers are double-width; that is, the hammer head is 0.2" wide. Only one hammer is therefore required for every two columns of print-out. A dual channel photo-electric code wheel is mechanically linked to the rotating print type font with one channel indicating the start of the character font, and the other channel providing a character timing pulse for each character position located on the chain.

The ribbon mechanism is a simple automatically reversing unit which traverses a standard  $\frac{3}{4}$ " wide ribbon horizontally.

A simple manual control provides for opening the carriage for a rapid paper load cycle.



## IN • DESIGN • RELIABILITY • SERVICEABILITY



**CHARACTER COMPLEMENT** Up to 192 different characters may be placed on the horizontally rotating type chain. This unique feature allows a change in code format by simply addressing the required font. For example, 4 sets of 48 characters can be utilized. In addition, any type slug may be changed by an unskilled operator in a matter of minutes. The absence of waving printlines due to misregistration is an outstanding by-product of this system.

**PRINT HAMMER** Potter patented double-width, controlled penetration hammers halves the number of required print hammers and associated drive control circuitry. Both hammer flight time and energy control are accomplished by adjusting of simple electrical controls. An exceptionally low power requirement\* for the hammers permits the use of a simple, unsophisticated, low-current power supply.

**RIBBON FEED** The 3502 Printer utilizes industry standard  $\frac{3}{4}$ " ribbon for clean, simple operator usage.

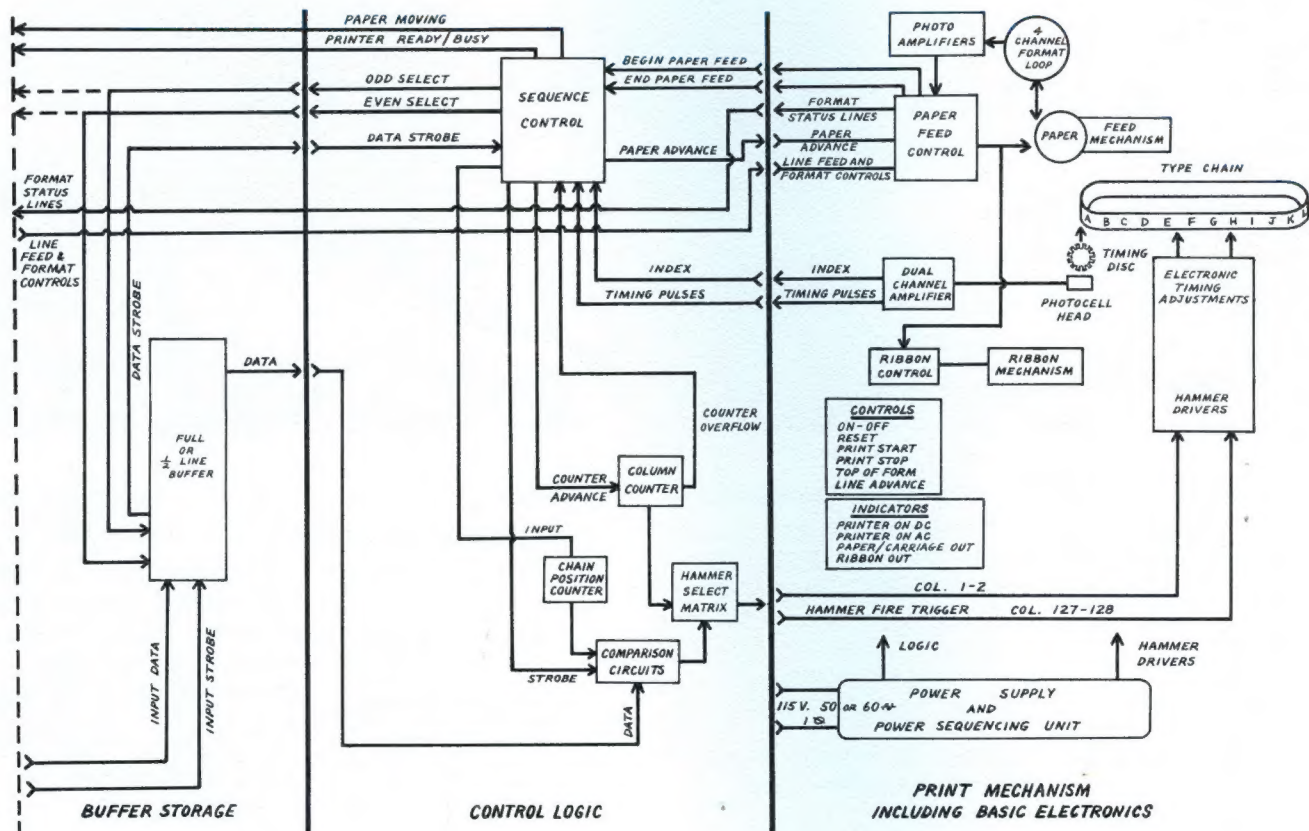
**PAPER FEED SYSTEM** The 3502 features an exclusive automatic paper feed system which provides clear, sharp definition, precise vertical registration, and immediate visibility of the last line printed. Internal or external paper advance is automatic. Paper width is  $2\frac{1}{2}$  to  $18\frac{1}{2}$  inches. Number of copies is up to six interleaved, card stock or Multilith master. Slewing speed is 17.5 inches per second. Line feed spacing is under control of an IBM compatible vertical format loop which is coupled directly to the paper feed tractor.

**CONSOLE** The HSP-3502 is supplied with its own sound-proofed cabinet which houses the printer mechanism, electronics and buffer unit. The attractive cabinet is supported by a rugged welded steel frame. Convenient accessibility is provided to all operator controls and for easy loading and removal of forms.



## SPECIFICATIONS - PRINTER MECHANISM

	Lines Per Minute	Number of Characters
Printing speeds .....	600	1— 48
	485	49— 64
	350	65— 96
	190	97—192
Column Capability .....	Up to 128 columns — standard; up to 160 columns optional	
Print Spacing .....	10 columns per inch	
Line Spacing .....	6 lines per inch	
Paper Feed System		
Form Width .....	2½" to 18½"	
Number of Copies .....	1 — 6	
Single Line Advance .....	18.5 milliseconds	
Paper Slew .....	17.5 ips	
Format Control .....	continuous 4-channel IBM-compatible photoelectric tape loop.	
Ribbon .....	conventional, low cost ¾" ribbon activated only during print cycle.	
Character Coding .....	dual channel photoelectric code wheel.	





## SPECIFICATIONS-MANUAL CONTROLS AND INDICATORS

ON  
PRINT START  
PRINT STOP

TOP OF FORM  
RESET  
LINE ADVANCE

PAPER OUT  
RIBBON OUT  
MAIN POWER

CABINET — STANDARD COLORS: . . . ARMORHIDE No. U-242 Medium Textured Grey  
ARMORHIDE No. U-11695 Ocean Blue  
ARMORHIDE No. U-621 Light Textured Grey

DIMENSIONS . . . . . 48"H x 44"W x 30"D

WEIGHT, APPROXIMATE . . . . . 500 lbs.

POWER . . . . . 115 volts AC,  $\pm 10\%$ , 50 or 60 cycles,  $\pm 3$  cycles, single phase



## SPECIFICATIONS - ELECTRONICS

The electronics comprise integrated circuit logic combined with all silicon semiconductors to provide maximum reliability.

A building block configuration offers the system engineer a wide variety of control and sequencing to accommodate virtually any conventional source of data, and is available in 4 standard configurations.

### 1. BASIC ELECTRONICS

- Low cost regulated power supply with integral power sequencing.

Power Requirements:

115 volts AC,  $\pm 10\%$ , 50 or 60 cycles,  $\pm 3$  cycles, single-phase.

- One hammer driver is included for every two columns with individual dual electronic adjustments to eliminate normal skilled critical mechanical adjustments.

Input Characteristics:

Positive Pulse — 2 microseconds, minimum duration

Rise/Fall Time — less than 500 nanoseconds

Logic "0" = 0V @ 1.5 milliamperes

Logic "1" = 4.7V @ 6 milliamperes

- Dual channel timing amplifier provides identification pulse for each character and a reset pulse indicating start of type font.

Output Characteristics:

Positive pulse of 5 microseconds duration with a rise/fall time = 0.5 microsecond with voltage levels +6 volts and 0 volts at 10 milliamperes sink or source.

- Ribbon Control: Automatic reversal of the ribbon at end of spool. Ribbon advanced automatically, during print cycle.
- Paper Feed: Line feed is controlled by punched holes in the four channel paper tape format loop for programming of the following functions:  
Top of Form  
Overflow  
Page Format  
Strobe

Automatic internal or external paper advance is provided with the above photoelectric control system, as well as external override of format functions.

### 2. CONTROL LOGIC

Input Lines

Print Command

\*6 Data Channels

\*Strobe Line

Format Control Lines

Line Feed

Output Lines

Printer Ready/Busy

Form Overflow

Format Strobe

Paper Moving

Top of Form

On Line/Off Line

\*The six data lines and strobe lines must be supplied at a minimum synchronous rate of 100 KC when the line buffer is external to the printer.

### 3. COMPLETE PRINTER CONTROL ELECTRONICS WITH HALF-LINE BUFFER

The  $\frac{1}{2}$  line buffer enables the computer to function at maximum efficiency with substantial cost saving. This is due to the employment of double width hammers where the print cycle occurs twice for each line. The minimum load cycle time of 4 microseconds per character remains constant with either a  $\frac{1}{2}$  line or full line buffer.

Information may be presented asynchronously up to a 250 KC serial by character, parallel by bit rate. Storage for the second group of characters should be accomplished within 10 milliseconds to maintain the maximum print rate.

### 4. COMPLETE PRINTER CONTROL ELECTRONICS WITH FULL-LINE BUFFER

When the application demands, a full-line buffer can be provided with the capability of being loaded asynchronously up to a 250 KC serial by character, parallel by bit rate. Storage for the second line should be accomplished within 18.5 milliseconds to maintain the maximum print rate.

Logic Levels:

Input Signal characteristics standards

"0" = 0V

"1" = +4.7V

Optional-Logic "0" and Logic "1" can be accommodated at either polarity with the following voltage levels:

0, + 3V

0, + 6V

0, - 3V

0, - 6V

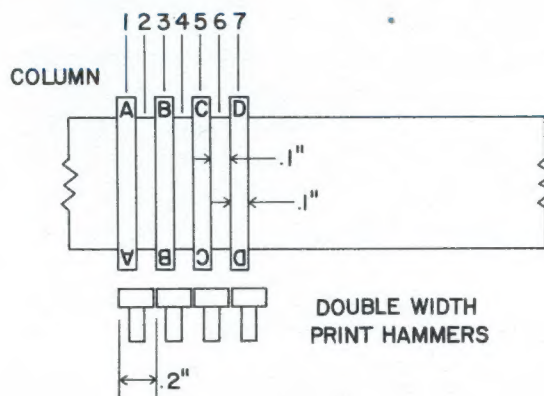


## PRINCIPLES OF OPERATION

This printer utilizes a continuous longitudinal traveling chain which contains up to 192 individually attached characters. The character type is spaced on .2" centers. Each print hammer is double width and spans two columns as illustrated.

The individual character slug is 0.1 inch, while the double width hammer head is 0.2 inch in width. A full line of print is accomplished in two cycles. Printing occurs first in the odd columns and then in the even columns. This two cycle print mode allows Potter the option of utilizing a  $\frac{1}{2}$  line or full line buffer. No loss of print speed results when a  $\frac{1}{2}$  line buffer is used since a  $\frac{1}{2}$  print cycle takes place in approximately 40 milliseconds. This allows the second group of even columns to be loaded in 10 milliseconds and still maintain a 100 millisecond full line print cycle or 600 lines/minute operation.

During each  $\frac{1}{2}$  of the print cycle, data, representing the odd or even groups of columns, is abstracted serially by character, parallel by bit from the buffer and compared with the character position counter. When coincidence occurs, the appropriate hammer is fired. This sequential comparison occurs



once for each character position on the chain. Comparison is accomplished at a 250 KC rate (with buffer) and occurs between adjacent character hammer fire times.

A reflex buffer, in addition to  $\frac{1}{2}$  or full line buffer, is available for synchronous operation as required in data phone or transmission media.

## EQUIPMENT

The basic printer is comprised of soundproofed console, print mechanism, paper and ribbon feed systems, and basic electronics.

The equipment is furnished complete with all controls, indicators and internal wiring and ready for interconnection and operation with a suitable control.

Four configurations are offered:

1. Console with basic printer mechanism, including basic electronics.
2. Control logic in addition to 1 above.
3. Half-line Buffer in addition to 1 and 2 above.
4. Full-line Buffer in addition to 1 and 2 above.

**POTTER WORLDWIDE FIELD SERVICE AND LOGISTICS PROGRAM** — Repair centers in strategic locations within the continental United States and abroad have been established to support the entire Potter product line.

Staffed by highly-trained field representatives, these repair centers are equipped to effect on-site installation of equipments and to perform quality repair, maintenance and overhaul.

Supplementing this capability, if a customer prefers to provide his own equipment support, Potter has established standard instruction courses to train customer personnel, either at Potter or in the field.

A Spare Parts Department, backed up by an extremely large inventory and streamlined order processing, is available for customer convenience and economy. This inventory permits the customer to realize virtual elimination of downtime as well as savings on spare parts dollars by offering expeditious delivery for replaceable parts. Delivery is available in 24 hours to meet customer emergency requirements—within 72 hours for standard parts under normal conditions. Potter also offers provisioning and logistics capabilities to meet all existing military specifications.

The Potter field service and logistics program is one of the finest in the EDP equipment industry. With reliable, quality-engineered equipment, supported by comprehensive field service, Potter guarantees satisfaction.

## ORDERING

Specify:

1. HSP-3502 Chain Printer.
2. Speed — lines per minute.
3. Number of characters.
4. Column capacity.
5. Configuration.
6. Console color combination.



**POTTER INSTRUMENT COMPANY, INC.**

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